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ABSTRACT

This document is designed to provide assistance to people in school districts who are responsible for making decisions regarding the purchase and use of microcomputers in business and office education programs. A section on planning considerations outlines considerations that need to be addressed, available resources, and maximizing the use of hardware and software. The following topics are considered in the section on teacher training considerations: necessary computer knowledge, where instructors can receive training, training that teacher training institutions and local districts should provide, and instructor responsibility for keeping current. The next section outlines these curriculum considerations: what students can learn to use, competencies students need, content that should be replaced by these competencies, and steps to ensure that the curriculum is not duplicated. The last two sections highlight hardware considerations (hardware selection, networks, computers in a lab setting, ergonomics, security, and maintenance) and software considerations (primary software applications, software selection, and copyright laws). A listing of 109 current references is also provided. Appendixes include sample forms, such as a planning packet for new vocational programs and hardware and software evaluation forms. A listing of suggested periodicals is appended. (YLB)

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GUIDELINES FOR THE DEVELOPMENT OF A MICROCOMPUTER CURRICULUM

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GUIDELINES FOR THE DEVELOPMENT OF

A MICROCOMPUTER CURRICULUM

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TABLE OF CONTENTS

	Page
Foreword	v
Research/Writing Team	vii
Consultants	viii
Recommendations	1
Planning Considerations	1
1. What considerations need to be addressed?	1
2. What resources are available?	3
3. How can hardware and software use be maximized?	3
Teacher Training Considerations	5
1. What computer knowledge is necessary?	5
2. Where can instructors receive training?	5
3. What training should teacher-training institutions provide?	6
4. What training should local districts provide?	6
5. What responsibility do instructors have for keeping themselves current?	7
Curriculum Considerations	8
1. Is it possible for students to learn to use all the current business software?	8
2. What competencies do students need?	8
3. What should these competencies replace?	9
4. Into what courses should these competencies be integrated?	9
5. What steps can be taken to ensure that the curriculum is not duplicated and moves from simple to complex concepts?	10

6. How do instructors deal with students that enter a class with some level of computer competence? 10

Hardware Considerations 11

1. What is computer hardware? 11

2. What considerations need to be addressed when selecting hardware? 11

3. What about networks? 15

4. Should computers be placed in a lab setting? 16

5. What about ergonomics? 18

6. What about security? 20

7. What about maintenance? 21

Software Considerations 23

1. What is computer software? 23

2. What are the primary software applications? 23

3. What considerations need to be addressed when selecting appropriate software for the classroom? 24

4. What about the copyright laws? 28

Current References 30

Appendix

Appendix 1 - Sample Forms 37

Appendix A - Districtwide Plan for Vocational Education, Planning Packet for New Vocational Programs .. 39

Appendix B - Suggested Periodicals 47

Appendix C.1 - Hardware Evaluation Worksheet 49

Appendix C.2 - Criteria for Judging Microcomputer Hardware 51

Appendix D.1 - Edmonds School District #15 Instructional Computer Software Evaluation 53

Appendix D.2 - Seattle Public Schools Media Services Software Evaluation Form 55

Appendix D.3 - Spokane Public Schools Business Education Vendor Evaluation Form 57

Appendix D.4 - Northwest Regional Education Laboratory Microsift Courseware Evaluation/Description 59

FOREWORD

Purpose of the Project

This project was designed to provide assistance to school districts that are in some phase of dealing with issues of purchasing and/or utilizing microcomputers in business and office education. There is information for districts that are just beginning to add computers, as well as for districts that are evaluating their computer curriculum. The intended audience is the people who are responsible for making decisions affecting business and office programs.

Rationale for Microcomputers in Business Education

Microcomputers are altering the structure of the business office. A review of current literature pointing out this fact can be summarized with the following statements: "The workforce of the information age must have the ability to use the computer with the same competence it now has with the telephone" (Agee 1985). "And by 1990 . . . three-quarters of all office personnel will use personal computers" (Allen 1985).

The widespread use of microcomputers in the business office has come about because microcomputers are relatively inexpensive and versatile and because of the ease with which they can be installed, understood and operated. An even more important factor is that "the technological advancements in microcomputer design will continue to increase the micro's ability to perform the same functions that could previously be completed only by a more expensive mainframe computer" (Golen and Smeltzer 1984).

Today's business employees must be aware of the effect that new and emerging technology will have on their work procedures. As the new technology is introduced, the content of traditional business and office education courses must change to meet the needs of the students--the employees of tomorrow.

The Committee Process

A statewide committee was formed to address issues regarding the integration of microcomputers into the business and office education program. The members of the committee were chosen for their expertise in the field. Members of the committee have been involved in such activities as developing a district plan for computers, designing business education software, and integrating microcomputer applications into the business and office education classroom.

The committee reviewed current and related literature. A representative listing of current references is included as a supplement. Following the listing are appendices of sample forms and a listing of periodicals which the committee members found helpful as reference/resource materials.

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RECOMMENDATIONS

The identification of these issues regarding the integration of microcomputers into the Business and Office Education Program is considered to be a "first step." The committee makes the following recommendations for the "next step":

1. This report be distributed to vocational directors/ administrators and business education departments in all school districts by spring 1986.

2. A statewide curriculum task force continue the efforts of this committee by developing a comprehensive, articulated curriculum for microcomputers in business and office education. This curriculum should include student learning objectives, course content objectives, curriculum content standards, and evaluation procedures.

PLANNING CONSIDERATIONS

1. What Considerations Need to be Addressed?

Thorough, timely planning is a necessity. It is highly recommended that the planning be part of a cooperative planning process for the entire school district.

The following considerations need to be addressed: (Bravo 1983)

A. Develop the plan

1. Identify a representative planning group

a. educators (administrative/instructional staff)
b. community representatives
c. advisory committee members
d. other resource people, including a paid consultant

2. Perform needs assessments

a. identify employment opportunities
b. define competencies needed by students

3. Identify resources

a. trained/interested people
b. facilities
c. hardware
d. software
e. budgets (present and forecasted)

4. Review/visit other programs and business environments

5. Develop program goals and course objectives

6. Develop scope and sequence of curriculum

7. Determine courses/programs where computers can be utilized

B. Implement the Plan

1. Determine use of computers

a. instruction
b. administration

2. Determine location of computers

a. mobile units, classroom, lab
b. network, stand-alone
c. power supply
d. environmental conditions

3. Consider security needs for

    a. hardware
    b. software
    c. facility
    d. storage

4. Determine responsibility for supervision

5. Evaluate/select hardware

    a. compatible with selected software
    b. based on
        1. program/district needs
        2. plan for future needs
            a. compatibility
            b. ability to interface/network/upgrade/enhance
    c. maintenance available
    d. training provided

6. Evaluate/select software

    a. based on
        1. scope and sequence (level of instruction)
        2. course/program objectives
    b. follow district policy for selection of instructional materials

7. Analyze funding

    a. costs
        1. start-up
        2. ongoing
    b. district purchasing policies/bid process
    c. budgetary constraints
    d. other funding sources

8. Develop inservice program

    a. determine needs
    b. plan for inservice opportunities
        1. initial
        2. ongoing

9. Determine hardware/software check-out policy for

    a. staff
    b. student
    c. community

C. Evaluate the planning

2. What Resources are Available?

The following sources should be investigated:

A. Funding sources

1. District budget

2. SPI start-up funds (see Appendix A: Districtwide Plan for Vocational Education, Planning Packet for New Vocational Programs)

3. Grants

a. Research Coordinating Unit (RCU)
b. Superintendent of Public Instruction (SPI)
c. private sector

4. Vendors

5. Foundations

6. Business firms

7. Advisory committees

8. Organization donations

a. Student
b. Parent/Teacher
c. Community

B. Lease options

C. Cooperating with others (using host computer with terminals)

1. Inter- and intra-district cooperative

3. How Can Hardware and Software Use be Maximized?

The following steps could help insure maximum use of hardware and software:

A. Planning thoroughly in the initial stages

B. Providing for continuous, ongoing inservice for teachers.

C. Exploring and utilizing the full capabilities of the hardware and software

1. Self-contained classroom

2. Inter- and intra-school

   a. among departments: e.g., math, science, agriculture, business
   b. among business and office classes: e.g., accounting, communications, electronic math applications

3. Inter- and intra-district

   a. among schools in close proximity
   b. among disciplines in other district schools

D. Providing for appropriate management of the program

1. Monitoring/supervising systematically

2. Evaluating the effectiveness of computer use

   a. time
   b. student learning outcomes
   c. student placement

E. Providing for the use of the hardware and software by other than students

1. Teachers

2. School Organizations

3. Community

F. Planning for the future on an ongoing basis

1. Continual upgrading of program and staff through

   a. cooperation with business community (advisory committee, other contacts, and/or work experience)
   b. attendance at conferences and workshops sponsored by various agencies, including professional associations
   c. college courses
   d. professional reading/research

2. Regular evaluation of program

TEACHER TRAINING CONSIDERATIONS

The "single most important component of the computers-in-school phenomenon is the inservice education of teachers. The nature and quality of the education is of prime importance." (DeVault and Harvey 1985)

The concern is that teachers are being trained to use computers, but they are not being trained to teach computing. Training courses often include such activities as learning how to load and run a program, playing some computer games (under the guise of computer-aided instruction) and maybe even learning a little programming. But they do not include such essentials as training to teach computing or evaluation of software. (Agee 1985)

1. What Computer Knowledge is Necessary?

   "Knowledge, or 'computer literacy' is whatever a person needs to know about computers in order to function in the information-based society of today." (Stanton 1985) Business and office education instructors need to know:

   A. The essentials of a computer system.

   B. The ergonomic considerations of microcomputer configuration.

   C. The difference between hardware/software and proper care and maintenance of both.

   D. The necessary skills to interact with the computer system, such as: loading, saving programs from disk or tape and generating printouts.

   E. The capabilities and limitations of the computer system.

   F. The ability to identify and implement the proper software to use for a specific application.

   G. The techniques and methodology necessary to insure appropriate student learning outcomes.

2. Where Can Instructors Receive Training?

   Instructors can receive training in a variety of ways, including the following:

   A. Post-secondary credit and non-credit courses.

   B. Vendor training through entitlement/district-funded programs.

   C. User groups.

   D. Self-paced instructional manuals.

E. District-sponsored inservice programs--taught by peers, vendors or consultants.

F. Work experience/on-the-job training.

G. Inservice programs sponsored and funded through professional organizations and/or state/federal agencies.

3. What Training Should Teacher-Training Institutions Provide?

A. All general education pre-service and retraining programs should require instruction in:

1. Knowledge and uses of computers in education.

2. Keyboarding skills.

3. Methods of teaching keyboarding/computers.

B. Business Education training programs should require instruction in:

1. Comprehensive computer knowledge, skills and instructional methodology.

2. Integration of computer usage into the business and office education curriculum.

4. What Training Should Local Districts Provide?

"Local districts need to assist with inservice activities for professional staff to implement their teaching of keyboarding skills and computer applications" (Palmer 1984-85). Ways districts might do this include the following:

A. Provide inservice training opportunities for teachers.

1. Outside consultant

2. District consultant
   a. train teachers
   b. help with software selection
   c. coordinate district computer efforts

B. Allocate funds and/or release time for teacher upgrading and training in computer education.

C. Schedule time for teachers to work on in-house equipment.

D. Develop a procedure to allow teachers to check out equipment to use at home.

E. Develop an exchange program in which teachers work in industry for a period of time and then return to the classroom; and, in turn, conduct inservice sessions for other teachers (industrial sabbatical).

5. What Responsibility Do Instructors Have for Keeping Themselves Current?

It should be noted that, as professional staff, instructors need to be mindful of seeking out resources to assist themselves with upgrading their skills and knowledges to meet the challenges of the new and emerging technologies.

Today is another day, and the marketplace has changed again! The days of a permanently-fixed curriculum are gone forever. As a result, business and office education teachers have a responsibility to keep current in their field through activities such as:

A. Work closely with program advisory committee.

1. Determine computer requirements in the job market (survey/ research).

2. Conduct an employing community survey.

B. Contact/visit other schools that have implemented computer curriculum.

C. Visit businesses in the community.

D. Read professional journals, including computer journals (see Appendix B: Suggested Periodicals).

CURRICULUM CONSIDERATIONS

1. Is It Possible for Students to Learn to Use All the Current Business Software?

   No, it is not possible. There are too many different types of software on the market to teach them all. The focus in the business and office education classroom must shift to teaching concepts. Methodology should include the following:

   A. Stressing concepts more than manipulation.

   B. Teaching students what they're doing and why they're doing it, rather than what key to push on a specific machine.

   C. Using machines as tools (not as vendor trainers) to teach concepts (it is not necessary for students to learn to operate every machine in the department).

   D. Introducing concepts manually, then performing applications electronically.

   E. Preparing students for life-long learning.

2. What Competencies Do Students Need?

   The following competencies are representative of those needed by business and office education students:

   Foundations:

   1. Use touch keyboarding skills to operate and control a terminal, microcomputer, or computer-driven information processing device to complete a pre-determined task, including the composition of simple documents at the keyboard.

   2. Identify, define and comprehend basic computer facts, terminology, concepts, principles and conventions.

   3. Identify and value the role of computers in society including their uses, security measures, ethics, benefits or limitations, and impact--both positive and negative.

   4. Identify and use the working parts of computer systems.

   5. Identify and use appropriate applications software, including:

      a. word processing
      b. accounting
      c. data base management

d. spreadsheets
e. other
    1. graphics
    2. telecommunications
    3. integrated software

6. Identify the roles and responsibilities involved in specific job titles in the computer field.

7. Develop appropriate personal work habits and attitudes.

8. Feel confident about the ability to use and control computers free from fear, anxiety or intimidation.

NOTE: This issue is addressed in more detail in the publication, MICROCOMPUTER CURRICULUM GUIDELINES, available through SPI.

3. What Should These Competencies Replace?

It is important to realize that the **curriculum cannot continue to expand without condensing content that is inappropriate in the electronic office.** In addition, some concepts should be deleted from the curriculum. Examples of changes that should be made in the area of keyboarding include:

A. In beginning keyboarding classes, a **minimum** amount of time should be spent on production activities. Developing rapid, accurate keystroking skills should be the primary emphasis.

B. A great amount of time need not be spent on carbon copies and manual correction techniques.

C. Seldom-used letter styles, such as Hanging Indent and Monarch, need not be introduced.

NOTE TO ALL BUSINESS AND OFFICE TEACHERS: Don't feel badly if you cannot include every bit of information you once taught. Ask yourself - What must students know to succeed in today's business world? How can the computer be used to teach it?

4. Into What Courses Should These Competencies Be Integrated?

Computers should be integrated into all business education courses.

NOTE: This issue is addressed in more detail in the publication, MICROCOMPUTER CURRICULUM GUIDELINES, available through SPI.

5. What Steps Can Be Taken to Insure That the Curriculum is Not Duplicated and Moves From Simple to Complex Concepts?

The following steps should be considered:

A. Developing, with input from a representative committee, an articulated K-12 district computer education program, including objectives appropriate for each level of instruction.

B. Working with an advisory committee to establish goals and objectives for the use of microcomputers based on business and industry standards.

C. Involving all teachers in the department in the development of the business and office computer curriculum.

D. Developing suggested applications for each level of each course.

E. Evaluating the curriculum on a planned cycle as hardware, software, courseware and students become more sophisticated and the demands of the employing community change.

6. How Do Instructors Deal With Students That Enter a Class With Some Level of Computer Competence?

Many times students will lead the instructor to believe they know more about computers than is actually the case. Instructors should not be intimidated by these students, but they should consider the following:

A. Administering a pre-test developed from the computer objectives for that course.

B. Requiring that all students meet the course objectives, progressing at their own rate (individualized curriculum).

C. Offering enrichment activities to students as they meet and/or exceed the course objectives.

HARDWARE CONSIDERATIONS

1. What is Computer Hardware?

Hardware is the physical equipment, including:

A. CPU

This is the central processing unit (CPU) of the computer system. Any hardware attached to the CPU is called a peripheral.

B. Keyboard

A keyboard resembles a typewriter keyboard with additional keys and controls. The operator inputs data to the CPU through the keyboard.

C. Display

A display resembles a video (television) screen and displays input from the keyboard and the CPU. It is known by other names, such as: monitor, CRT (cathode ray tube), VDT (video display terminal), and screen.

D. Disk Drive

A disk drive is a device that houses, searches and reads disks and then sends the information from the disk to the computer. It also receives information from the computer and records it on a disk.

E. Printer

A printer is a device that produces hard copy (alpha-numeric data and/or graphics printed on paper).

F. Modem

A modem, along with other attachments and compatible software, enables the operator to utilize the computer for transmitting and receiving data over telephone lines.

2. What Considerations Need to be Addressed When Selecting Hardware?

The following considerations need to be addressed:

A. Hardware evaluation and selection (Wood 1985).

1. Follow the district's equipment selection guidelines.

2. Appoint a representative selection committee.

3. Develop a checklist of desired machine features (specifications) based on application needs and software requirements.

4. Request information from vendors.
   a. warranty policy
   b. availability and cost of local service and repair
   c. inservice provided (entitlement program)
   d. list of software available
   e. installation policies
   f. availability and cost of instructional support materials
   g. initial and enhancement costs of hardware
   h. availability of consultative/installation services
      1. environmental configurations
      2. electrical needs
      3. ergonomic design

5. Submit the specifications to appropriate vendors.

6. Schedule committee meetings where each vendor will demonstrate the equipment, provide hands-on time and answer questions.

7. Develop an evaluation form to evaluate each vendor's equipment (see Appendix C: Hardware Evaluation Worksheets).

8. Submit committee recommendations for district approval.

NOTE: Selecting one vendor can enable a district to minimize compatibility problems and facilitate such factors as inservice, curriculum design, maintenance and software acquisition.

B. CPU (central processing unit)

CPU considerations include:

1. Desirable specifications
   a. RAM (random access memory) that is equal to or exceeds the software requirements
   b. parallel and serial ports (dependent on printer and modem requirements)
   c. expansion capabilities
   d. color/graphics capability
   e. telecommunications capabilities
   f. sound capabilities (signal, music)

2. Should run contemporary software; e.g., spreadsheets, data bases, word processing, accounting and graphics.

3. Should be produced by a stable manufacturer with optimum service and customer-support reputation.

C. Keyboard

Desirable keyboard specifications include:

1. Standard (QWERTY) keyboard
   Alternative keyboards, such as the Dvorak, are possibilities of the future. At this time, however, the QWERTY keyboard is the industry and educational standard.

2. Keyboard with word processing capabilities
   a. convenient shift, return, space, backspace, tab, upper/lower case, and punctuation keys
   b. function keys
   c. convenient cursor control keys

3. Keypad with standard ten-key calculator configuration
   a. size, touch and reaches
   b. control keys - plus, minus, multiplication, division, decimal point and total

D. Display

Desirable display specifications include:

1. Minimum diagonal size of 12 inches. Full display is desirable, but generally involves additional cost. A partial display is adequate for instructional purposes.

2. Adjustable to avoid glare, reflections, and wash-out, and for operator comfort (ergonomically designed).

3. Monochrome for data input and word processing tasks.
   a. characters on a good monochrome display are much easier to read than those on a good color display
   b. green or amber are equivalent - minimized contrast is best (black-white screens tend to produce more eye strain than tinted screens)
   c. characters displayed must be sharp, straight and of equal proportions (resolution)
   d. some situations may require appropriate display hoods or filters for optimum viewing (permanently-fixed mesh glare protectors are not recommended, because they are easily scratched and marred)

4. A color display with crisp, vivid colors is essential for graphic representations.

E. Disk Drive

1. There should be a number of work stations in a classroom operating with two (dual) disk drives.
   a. required to operate some software
   b. for copying disks

2. Types of disks include the following:
   a. Floppy - a thin, flexible platter (coated with magnetic material and housed in a square protective jacket) that is used as the storage medium.
      1. sizes vary from 5¼ to 8 inches.
      2. a single floppy disk will never contain as much storage capacity as a hard or fixed disk.
      3. disks must be of good quality both for reliable performance and to protect drive mechanism.
   b. Hard/Fixed - a rigid disk of magnetic or magnetically-coated material, rotating in a sealed housing and used as a recording playback system or storage bin for computer programs and data.
      1. can be operated at higher speeds.
      2. greater capacity and reliability (less handling).

F. Printer

The two most commonly-used types of printers are:

1. Dot matrix (prints a grid of dots)

   Desirable specifications include:
   a. 80-100 or more cps (characters per second), equals 900-1200 wpm (words per minute)
   b. friction feed and track feed
   c. 15-inch platen (accommodates both 8½- and 11-inch wide paper)
   d. capacity for near letter-quality print
   e. capacity for graphics
   f. pitch selections: 10, 12, 15
   g. print enhancements: overstrike, bold face and underscore
   h. capacity to compress and enlarge horizontal and vertical spacing

2. Letter Quality/Daisy Wheel*

   Desirable specifications include:
   a. pitch selections: 10, 12, 15 and proportional
   b. friction feed and track feed
   c. at least 20 cps (240 wpm)

*NOTE: Most commercial-type <u>electronic</u> typewriters have the capability of being interfaced with computers. This provides a cost-effective unit that doubles as a letter-quality printer while remaining available for performing typewriter functions. It is important to verify compatibility of the two pieces of hardware.

G. Modem

Desirable specifications:

1. Must be compatible with hardware and software to be used.

2. Capable of automatically sending and receiving data at specified times.

3. What About Networks?

A network is a system for interconnecting hardware within a specified area (such as a room, a building, a school district or a state) to allow communication and resource sharing among the interconnected/linked computers.

A. Desirable specifications

1. Contains a powerful host computer, which can be used to perform ongoing functions while it is serving the network.
   a. fixed-disk drives
   b. 32-bit or higher processor
   c. capable of interfacing with a mainframe computer

2. Accommodates a variety of hardware systems, comprising a number of configurations.

NOTE: There are many kinds of networks. They differ extensively in capabilities and costs. Present and future use should determine which network to select.

B. Advantages of networks

1. Cost effective
   a. need only one powerful computer -- other hardware gains capabilities from this host
   b. one or two specified peripherals (such as disk drives, printers, modems) can serve many work stations
   c. only one copy of a software program is needed to serve as resident software for the host computer
   d. time may be saved it if is necessary to edit or modify the software program

2. Control can be more effective
   a. the minimal number of disks to control and maintain minimizes errors and problems
   b. access to various programs may be easily denied or controlled through system protection coding
   c. teacher can monitor the work of individual students from the teacher station

C. Disadvantages of networks

1. There is limited availability of suitable network-compatible software that has been released by the vendor to be used for networking.

2. Since the host and peripherals must be shared, simultaneous requests may result in a delay, which is contingent on the host's capacity.

3. If the host is inoperative, the whole network may be inoperative.

4. Cables that connect computers and peripherals to each other may be troublesome and may cause unsafe conditions unless appropriately installed.

5. Though far more versatile now, networks are still limited to selected computers and peripherals.

6. "Dumb" terminals do not provide the portability and flexibility of stand-alone, self-contained intelligent stations.

D. Summary

1. Reasonably-priced, state-of-the-art networks with second or third generation computers and peripherals are now available. As this technology is perfected and suitable software becomes available, networks will be effective tools for all business and office education computer instruction.

2. In the meantime, because of the current availability of suitable word processing software, it is possible to set up an effective specialized network for word processing.

3. Prior to purchase, a careful analysis should be made of all aspects of the network system, including workability, software compatibility and legality, and the comparative total cost per student station.

4. Should Computers Be Placed in a Lab Setting?

A computer lab is a dedicated area in which the primary focus is computer instruction. Students are sent to the lab from different classes or are assigned to the lab during a specific period of the day.

A. Advantages of computer labs

1. Staff members with the strongest computer background are available to all students.

a. Where computers are distributed throughout a department or a school, levels of computer knowledge/expertise among staff members vary greatly.
   1. some students receive excellent instruction; others, minimum.
   2. if a staff member is supervising a computer lab most of the day, the opportunity to master computer skills is far greater than that of a staff member who can devote limited time to advancing computer knowledge.

b. Maximum understanding of computer capabilities promotes more computer utilization.

2. It is easier to access computer materials and resources in one location (such as files, periodicals, reference texts and manuals).

3. Security against theft and damage is more effective and easier to maintain when computers are concentrated in one appropriate location.

4. A specific area to house the computer lab could be identified as "Electronic Office" or "PC Library" to more clearly define the skills being delivered and also to serve as a marketing device to motivate students.

B. Disadvantages of computer labs

1. It is often difficult to release a staff member to supervise a computer lab (if students are scheduled into a lab for a semester, it is no longer a lab to be shared). It is essential that a computer lab be staffed by a full-time supervisor.

2. When labs are isolated, other staff members feel less inclined to learn about computers and how such technology can be used.

3. Problems may arise when students are rotated into a computer lab from their assigned classrooms.
   a. other classes may be disrupted as students move through the corridors
   b. learning time is lost in passing time
   c. attendance and discipline problems may arise among students who cannot adapt or accept the responsibilities involved

4. Decentralized computers may be more adaptable to specialized applications in separate locations; for example, accounting classes could more easily integrate computers capable of running accounting programs.

5. Busy staff members are reluctant to take advantage of computers if they are not readily accessible.
   a. it takes a special effort for such activities as scheduling, working with computer instruction and preparing flexible lesson plans
   b. when computers break down or schedules are disrupted, it is often difficult to adjust lesson plans

C. Summary

1. Whether "to computer lab or not to computer lab" is dependent upon many factors; e.g., budgets, facilities, staffing, staff expertise and student enrollment.

2. The optimum configuration is a combination of computer labs and decentralized computers.

5. What About Ergonomics?

Ergonomics is the science of designing the elements in a worker's environment so that a compatible, harmonious relationship exists which, in turn, results in greater productivity.

A. Computers, peripherals, furniture and facilities must be safely used.

1. Although evidence is not sufficient, as yet, to support the claim that those who use video display terminals (VDTs) will suffer ill effects, there are a number of things that do cause mild to considerable discomfort.
   a. it may be necessary to use glare shields or adjust lighting to assure a reasonable reflection-free display
   b. little evidence supports the use of one tinted screen (amber or green) over another; however, reducing contrasts tends to reduce eye fatigue (this is why black and white screens are losing favor)
   c. a high-quality display is essential in order to produce crisp, legible characters
   d. frequent changes of activity may provide time to rest eyes - continuous, uninterrupted sharing at a video screen for long periods of time causing discomfort and illness according to some reports
   e. the copy should be illuminated brightly without washing out the display resolution
   f. tinted eyeglasses are recommended for operators with lightly pigmented irises (light blue or grey)

2. Distorted or unsupported posture for extended lengths of time can cause pain and discomfort to computer operators.
   a. keyboards must be placed at a level that provides the most comfort - platform and/or chair may be adjusted. Disjoined or separate keyboards are recommended

b. chairs are available that can be adjusted to support both back and forearms (Note: there is a computer seat without back support, but with shin support, that is claimed to minimize fatigue; however, not enough independent research is available to verify this claim)--mobile chairs with five casters are preferred
c. ergonomically-designed copy holders (DEMAGNETIZED) should be of the type that can be positioned so that neck strain is minimized
d. seating should be arranged so the operator's eyes are between 17 and 20 inches from the display

3. Auditory sources that disrupt or irritate must be controlled.
   a. high-level noise from such devices as printers, telephone bells and buzzers can be sound dampened or proofed (acoustical filter hoods for printers)
   b. an enforced working climate or appropriate partitioning can reduce disruptive noise from talking by others, as can carpeting and drapes (ANTI-STATIC control should be observed)
   c. earpieces that are used for machine transcription should attach to both ears to reduce distracting sounds and provide for clearer reception

4. Control of climate and atmospheric conditions is essential for both operators' and computers' performances.
   a. extremes in temperature and humidity must be avoided; recommended temperature is between 68 and 72 degrees F
   b. if dust and chalkboard particles cannot be controlled, computers, peripherals and software must be protected by anti-static dust covers (chalkless boards using dry markers are highly recommended)
   c. avoid direct sunlight, heater ducts and air conditioners on hardware/operators
   d. when heating/cooling systems are adjusted for weekends/ vacation periods, mold and micro-organisms may build up in the ventilation system; when systems are reinstated (Monday mornings) these substances may be distributed around the room causing illnesses resembling pneumonia; this concern may be resolved by adequate installation and housekeeping considerations and techniques

5. Equipment and software must be protected from careless practices and harmful conditions.
   a. beverages must be kept away from computers, peripherals and software to avoid costly repairs which, in turn, cause delays and lost time when input data is delayed or destroyed
   b. cigarette ashes and smoke may damage delicate computer circuitry and software (smoking near the CPU is particularly hazardous)

c. climate, clothing, equipment and furnishings that create electromagnetic interference or static electricity can be devastating (precautions such as the use of anti-static materials, sprays and devices can prevent this damage)
d. a stable, suitable electric current is essential; otherwise, proper surge protectors or electrical backups must be installed
e. disks should be kept at the same temperature as the computers
f. original disks and backup copies of disks should be stored away from working copies, preferably in a vault in a wooden container

6. Common sense precautions should be taken to avoid injury to operators and damage to equipment and facilities.
a. all electrical cords and electronic cables must be safely installed and kept in good condition to avoid injury from shock or tripping (OSHA regulations)
b. desks/tables must be sturdy enough to accommodate the combined weight of the system peripherals
c. equipment and facilities must be configured so as to be easily accessible by students and instructors (consideration should be given to instructor's VDT viewing range as well)
d. importance of maintaining an organized work station must be stressed

B. Human needs must be considered.

1. High levels of concentration are required by computer operators; this concentration must not be disrupted by undisciplined behavior.

2. Sustained efforts should be avoided; other activities should be interspersed (it is recommended that the operator take a 15-minute break from the VDT every two hours to do other tasks).

3. An understanding of the purpose of each computer application can increase the learning and enjoyment for the operator.

6. What About Security?

Security refers to the means of protecting hardware and software against theft and damage.

A. Staff members must be security conscious.

1. Clearly established responsibilities must be assigned to staff members for monitoring computers and peripherals.

2. Substitute instructors must be provided with written instructions, which hold them responsible for security procedures.

B. All hardware and software packages should be numbered to aid in establishing responsibility for loss and providing information on theft or damage (do not use lead pencils or ballpoint ink pens to write on disk jackets; use felt-tip markers).

1. Assign students to specific computers/work stations.

2. Establish a checkout system for use of software in classroom/lab.

C. Computers should be clearly and permanently etched with such information as serial number, name of institution and assigned room/building location.

1. People who take computers usually do not keep them; if they are difficult to sell because of distinctive markings, there is less chance such computers will be stolen.

2. An up-to-date inventory and location chart must be maintained to aid the police if a theft takes place.

D. The addition of special locks on doors and windows may be necessary because existing locks, though adequate for general school security, may not be adequate for computer security.

E. If budgets permit, electronic security systems should be installed to protect the equipment.

F. A district/school/department policy addressing personal use of computers, including the use of arcade-type games, should be developed.

7. What About Maintenance?

Computers and peripherals should never be purchased without considering the availability and quality of local maintenance support. Equipment that is a good buy can be so expensive to maintain or so unreliable that it is worthless at any price. This happens when parts, service manuals and supplies are unavailable and when service personnel are not available when needed and/or are inadequately trained.

A. Rapid, reliable repair service must be readily available for computers and peripherals.

1. In-house personnel

2. Contracted

B. Preventative maintenance program is essential.

1. Periodic checks by service personnel.
   a. clean and lubricate components
   b. check alignment and speed of disk drives
   c. check electronic circuitry

2. Regular classroom maintenance procedures
   a. take into account such factors as temperature, ventilation, electrical supply, chalkboards, dust, electromagnetic interference and static electricity (the NUMBER ONE enemy of computers) when determining placement of computers in the classroom
   b. limit the number of times a computer is turned on and off during the day (leaving computers on all day is recommended)
   c. maintain an organized work area
   d. do not allow food, drink or smoking near computers
   e. clean equipment regularly (may be done by students)
      1. screens may be cleaned with a soft cloth and either a glass cleaner or alcohol - check with vendor; alcohol is suggested for screens that have the black nylon anti-glare covering
      2. hardware cases may be cleaned with any household cleaning product; be careful not to spray liquids directly onto the keyboard, but rather apply the cleaner to a cloth which can be used to wipe the keys
      3. the inside of printers may be cleaned with a small vacuum cleaner with a narrow nozzle or with pressurized canned air (available from a photo store) - check with vendor

C. The fewer vendors involved, the less costly it is to service the equipment.

1. Diversity of such items as ribbons, manuals, tools and parts impact logistics and training.

2. Students unfamiliar with equipment are more apt to lose learning time and damage such equipment.

SOFTWARE CONSIDERATIONS

1. What is Computer Software?

Software is the set of instructions fed into the computer to tell the machinery how to process the data entered.

A. The instructions that run the hardware are known as operating systems software.

B. The instructions that tell the computer how to process specific data are called applications software.

C. Documents associated with the operation of a computer system are often considered to be software, also.

2. What are the Primary Software Applications?

A. Word Processing

Word processing is an interactive applications software program which allows the user to format and edit text.

1. Text formattor allows user to send the text to a peripheral device (printer) exactly as it will appear on the printed page.

2. Text editor allows user to enter and change text on the screen.

3. Allows computer to be used in much the same way as a typewriter, with some exceptions.
   a. writing is stored electronically
   b. inserting, deleting and moving text is easily, cleanly and more efficiently accomplished

B. Accounting

Accounting is an applications software program for maintaining financial records, including general and special journals, payables/ receivables and payroll.

C. Data Base Management

Data base management is an applications software program which allows the user to manage a collection of information (data base/date file).

1. Designing and creating a data file.

2. Accessing and manipulating a data file.
   a. change/update
   b. sort
   c. match
   d. generate a variety of reports in a variety of formats

D. Spreadsheets

Spreadsheet applications is a software program which calculates the results of relationships between numerical data and prints them out in graphic or columnar form, with the ability to show quickly what new results will arise from changes in the data or assumed relationships.

1. Puts a piece of columnar paper on the screen, dividing it into rows and columns.
   a. each intersection of a row and a column forms a cell which holds a number, word or formula
   b. cells are linked together by formulae

2. Uses the power of the computer to automatically recalculate and alter all cells linked to the original cell when the value in one cell is changed.

3. Useful for such activities as forecasts, projections, checkbook registers, budgets, inventory lists and bookkeeping.

3. <u>What Considerations Need to be Addressed When Selecting Appropriate Software for the Classroom</u>?

"In a developing industry-like, personal computing software, where there is such bewildering variety and new products arriving by the hour, there is seldom a clear, single best choice. Instead, you can usually find several products that you'll like, each of which offers different trade-offs." (Fawcette 1984)

A. General questions to be answered (Schmidt 1985)

1. Can the program software be copied without violating copyright laws, or must the original software be purchased for each user/machine?

2. Can the program disk be loaded into a microcomputer, then be removed and used to load additional microcomputers? (If the program disk is accessed during operation, must it remain in the microcomputer?)

3. How complicated are procedures for storing text? Will excessive disk handling be required?

4. Are additional disks required for student operation and/or storage of their work?

5. How much RAM (random access memory) is required for the software?

6. How many disk drives are required for the software?

7. If the microcomputers are networked, are the hardware and software compatible? Are the software vendor's licensing requirements prohibitive?

8. What procedures must be followed to produce hard copy (printouts)?

9. What are the hardware specifications? Is it compatible with available hardware?

10. Is the documentation (instruction manual) easy to follow? Are training disks or cassettes available?

B. Characteristics of good software (Nesbit)

1. Little effort is required of the user (e.g.; few keystrokes, simple cursor movement on the screen, easy entry and exit).

2. User need not memorize commands, functions, or processes (should be intuitive, since the software may be used infrequently).

3. Software imitates the work patterns of the user (computer processes should be similar to manual processes).

4. A good word processing program should
   a. require as few keystrokes as possible to make changes in the text
   b. enable the user to
      1. insert and delete words, lines, blocks and pages, as well as characters
      2. move the cursor easily from one point in the document to another
   c. provide
      1. a status feature which indicates line, column and function being performed
      2. variable margin settings and tabs
      3. scrolling features for moving quickly from one point to another in the text
   d. permit
      1. underscoring
      2. automatic centering
      3. changing page width and length
      4. justifying
      5. proportional spacing
      6. moving or copying blocks of text
      7. integrating with other software applications, such as data base and spreadsheet

5. A good data base management program should
   a. enable the user to
      1. create a data file format
      2. change the design or format of the file
      3. add data to the file
      4. correct/delete/edit/replace data
      5. perform sophisticated search and replace functions
      6. perform numeric and alpha-numeric sorts
      7. transfer data from one file to another
      8. produce a printout of all or parts of the file easily, in a specified format
      9. perform simple arithmetic functions and compute totals
      10. integrate with other software applications such as spreadsheet and word processing

   b. enable the user to answer these questions appropriately
      1. how easy is it to learn the system?
      2. how easy is it to make changes in individual records or in the file structure?
      3. are the search and replace functions adequate?
      4. can the fields be printed in any order?
      5. how many records can be written at one time, with how many fields in each record?
      6. how long does it take to sort?

6. A good spreadsheet program should
   a. meet the needs of the user with regard to
      1. capacity
         a. size of spreadsheet the program can handle (maximum number of rows and columns)
         b. amount of RAM (random access memory) that the data and the program require; the more features a spreadsheet has, the more memory it requires

      2. maneuverability/speed
         a. look for split windows (horizontal, vertical or both)
         b. speed with which program can find a specific cell
         c. speed with which program scrolls beyond one screen of numbers

         NOTE: recalculation speed is not considered a high priority

      3. command structure
         a. menu-based programs are easy to learn and use, but slow; the experienced user will want to be able to bypass the menu
         b. word options are easier to learn and read than codes
         c. coded commands should be logical (abbreviated to the first letter of the word, such as "S" for "save")

4. layout and labeling features
    a. ability to label cells with familiar terms, numbers, number and letter combinations, or row and column directions (e.g.; A-11)
    b. ability to have variable width columns
    c. ability to move or insert rows or columns
5. other features
    a. ease of entering and viewing data, saving and loading files, creating graphics and printing and formatting
    b. dating (entry date)

b. provide options, including
1. integration
    a. use of common commands eliminates need to learn new ones for each component
    b. integrated packages are less expensive than separate packages
    c. individual components of the integrated package are more limited/less flexible than separate programs for each component
2. macros
    a. allow user to, in effect, write a program within the spreadsheet which simplifies repetitive tasks
    b. look for ability to create and store menus
3. templates (applications software programs that load into a spreadsheet and have the precise math formulae for specific problems already worked out)
    a. eliminate the need to design spreadsheets for specific applications
    b. templates for many common problems are available for most popular programs

C. Software evaluation procedures (See Appendix D: Software Evaluation Forms)

1. Follow district software preview and evaluation procedures.

2. Identify
    a. program objectives/SLOs
    b. functions and concepts to be taught
    c. grade level, age and ability of users

3. Identify the software program that best meets the identified objectives.

4. Check for available evaluations, such as those provided by trade magazines, professional organizations and vendors.

5. Get opinions of users
    a. educators
    b. business community

6. Arrange for preview/demonstration on a machine like the one to be used, in the way it would be used--by students in the classroom, if possible.

7. Test the package for "user friendliness"; determine whether or not the following tasks can be accomplished by reading the screen.
   a. start the program
   b. get text up on the screen
   c. edit text
   d. send it to the printer

4. Answer the following questions:
   a. Can the same task be done better without a computer?
   b. Is the program intrinsically fun/worthwhile to use more than once?
   c. Does the program enable users to practice what they are learning--to vary and experiment with it--so that learning becomes internalized?
   d. Is it open-ended?
   e. Can the teacher or student modify the program?
   f. Do users have any control over the program?
   g. Is the program flexible enough to be integrated into the curriculum?
   h. Does the program isolate the user, or can it be used in a group as well as by individuals?
   i. Do the learning assumptions behind the software methodology fit with district/department philosophy?
   j. Is the software designed for the age and ability level of the students that will be using it?
   k. Does the program make full use of the technology of the computer?
   l. Is the program grammatically sound and free of unnecessary computer jargon and spelling errors?
   m. Are the instructions in the program clear to the students?
   n. How does the cost compare to other comparable software?

4. What About the Copyright Laws?

Recent court decisions with regard to the copyright law point out the fact that many common practices are illegal and could result in a lawsuit. The most common violation involves the outright copying of a copyrighted program. (Harris 1984)

A. Copying

1. One backup copy is permitted by law (this copy must be destroyed or transferred when the original is sold or otherwise changes hands).
   a. some vendors provide backup copies
   b. common practice is to make a working copy from the original and store the original as the backup copy

2. Purchasing one copy and making additional copies for use is illegal.

B. Liability

1. One who aids in illegal copying, directly or indirectly, is also liable.

2. Minimum penalty is $100 per infringement, plus court costs and attorney fees.

C. Ways to minimize illegal copying

1. Warn students and teachers against unauthorized copying.

2. Keep software in a limited-access area.

3. Carefully supervise student use of software.

4. Take appropriate disciplinary action to discourage violators.

5. Allow no personal software or copy utility disks in the classroom or lab.

6. Require faculty and students to sign a statement that they will not make copies (some licensing agreements require this).

D. Ways to work within the law

NOTE: The user should read each software agreement carefully, since some programs have restrictions in addition to the copyright law.

1. Take turns using a single disk (the "copy" of a program stored in memory is not considered to be an illegal copy).

2. Boot (load) the program into each machine, one at a time, using a single disk (this will work with programs that load completely into memory).

3. Purchase a multiple-use license from the software company.

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"Technological Literacy and the Automated Office." Northwest Regional Educational Laboratory, (June 15, 1984).

Tolle, Brenda. "Getting Started With Computers." Data Base, (Spring 1984), pp. 1 and 2.

Townsend, Joyce A. "Restructuring Your Curricula - Keeping Pace In Today's Changing Workplace." Data Base, (Spring 1985), pp. 5-7.

Verity, John W. "Upstarts Outshine the Stars." Datamation, (November 15, 1984), pp. 34-52.

"Washington State Business Education Association's Statement on Computer Literacy." (October 13, 1983).

"What Do Employers Want? The Core Competencies." A Special NEA Report for Vocational Educators, (1984).

Wilkins, R. P. "How Lawyers Can Use Microcomputers." Byte, (May 1984), pp. 160-167.

Wollenhaupt, Jan. "We Love To Compute." Printout for Business Education, (Fall 1984).

Wolman, Rebekah. "The Lonely Road, Training for the Other 62." Data Training, (February 1985), pp. 11 and 25.

Wood, Merle. "Implementing an Information Processing Program." Business Education Forum, (April-May 1985), pp. 72-78.

"Word Processing in Business Education." Statement by the Policies Commission for Business and Economic Education, (1983).

"Word Processing Software." Personal Software, (July 1984), pp. 125-140.

APPENDIX 1: SAMPLE FORMS

A. Districtwide Plan for Vocational Education, Planning Packet for New Vocational Programs

B. Suggested Periodicals

C-1. Hardware Evaluation Worksheet

C-2. Criteria for Judging Microcomputer Hardware

D-1. Edmonds School District #15 Instructional Computer Software Evaluation

D-2. Seattle Public Schools Media Services Software Evaluation Form

D-3. Spokane Public Schools Business Education Evaluation Form

D-4. Northwest Regional Education Laboratory MicroSift Courseware Evaluation/Description

APPENDIX A

DISTRICTWIDE PLAN FOR VOCATIONAL EDUCATION

PLANNING PACKET

for

NEW VOCATIONAL PROGRAMS

1986-1987

NOTE: Submit all narratives requesting approval for new vocational classes or programs, including Skill Centers to:

Gene Forrester
Supervisor of Vocational Administration

State of Washington
SUPERINTENDENT OF PUBLIC INSTRUCTION
Old Capitol Building FG-11
Olympia, Washington 98504

November 1985

APPENDIX A (2)

DESCRIPTION OF NEW VOCATIONAL EDUCATION PROGRAMS PROPOSED FOR 1986-87

NEW classes are classes not approved vocationally during 1985-86 or classes in additional schools which generate additional enrollment hours.

If the entire proposal for a new class is not completed in time to be submitted with the DWP in May, it should be submitted no later than August 15, 1986, in order to be processed prior to the beginning of the first semester. If startup monies are desired and if available the complete proposal must be received in SPI no later than June 15, 1986.

Proposals received after the 1st day of school for the first semester will be approved for funding for the 2nd semester or trimester. Completion of the following information and material is needed for each new class:

--A narrative description of the class written to the outline entitled "Planning for New Vocational Education Classes and Programs" (Revised 85-4a).

--DOCUMENTATION OF COSTS FOR NEW VOCATIONAL CLASSES--Form F-133 (sample form included in this packet).

--Advisory Committee minutes containing action recommending approval, signed by the chairperson and dated prior to the submittal date.

--The availability of an instructor with current and appropriate vocational certification.

If help is needed in planning new vocational programs or classes, districts should contact the following Vocational Education Program Development staff members directly:

Vocational Agriculture - Mr. Gene Forrester, Program Director - 206/753-2588

Business & Office Education - Dr. Mari Shaw, Program Supervisor - 206/753-5647

Marketing & Distributive Education/Diversified Occupations - Mr. Jack Ray, Program Director - 206/753-2060

Home and Family Life Education - Ms. Nancy Johnson, Program Director - 206/753-5670

Trade & Industrial, Health Occupations and Vocationally Approved Industrial Arts - Mr. Richard Spice, Program Supervisor - 206/753-5675

Submit all proposals to: Gene Forrester, Supervisor Vocational Administration
Division of Vocational-Technical
and Adult Education Services
State Superintendent of Public Instruction
Old Capitol Building
Mail Stop - FG-11
Olympia, Washington 98504

APPENDIX A (3)

State of Washington
SUPERINTENDENT OF PUBLIC INSTRUCTION
Old Capitol Building - FG-11
Olympia, Washington 98504

PLANNING FOR NEW VOCATIONAL EDUCATION CLASSES AND PROGRAMS

A narrative containing the following information shall be submitted to the Office of the State Superintendent of Public Instruction, Division of Vocational-Technical and Adult Education Services, for evaluation of a proposed new class, or program in terms of the standards for vocational education programs specified in SPI publication 86-4b.

OCCUPATION IDENTIFICATION -- Identify the specific occupation or occupational field for which the program is intended by using the title and CIP code number as taken from the enclosed list of secondary vocational teaching assignment codes.

NEED -- Document the need for additional trained personnel in this occupation or occupational area through recommendations from advisory committees, local surveys, Employment Security and/or other reliable data sources. If statistical data is abstracted for supporting documentation, it should reflect the current year and projected statistics.

STUDENT CHARACTERISTICS -- Describe the potential students for which the program is intended. Include such of these items as are applicable: Grade, sex, age level or group, occupational aspirations, handicapped and/or disadvantaged.

COURSE OBJECTIVES -- Identify the specific employment objectives in terms of competencies to be developed in each of the major units of instruction with measurable student learning outcomes. Indicate the number of hours of instruction planned for each major unit.

SEQUENCE OF INSTRUCTION -- List the sequence of courses offered for the occupational area being trained for showing how this course fits into that sequence. For example, which classes are necessary to complete training for Clerk Typists.

TYPE OF INSTRUCTION -- Indicate the type of instruction to be utilized, i.e., lecture, demonstration, field trips, cooperative, etc.

FACILITIES AND EQUIPMENT -- Indicate what facilities, equipment and supplies are to be provided for this course.

STUDENT LEADERSHIP DEVELOPMENT -- Indicate how student leadership development will be incorporated as an integral part of the instructional program through inclusion of student learning objectives established for this class. Indicate if an affiliated national vocational student organization will be utilized. Indicate how disadvantaged and handicapped students will be encouraged to participate in leadership activities and in student organizations.

SUPERVISED OCCUPATIONAL EXPERIENCE -- Where appropriate (Voc. Agriculture, Home and Family Life or Cooperative Education programs) describe plans for students supervised occupational experience programs, extended learning activities and/or on-the-job cooperative training sites.

SUPERVISION/COORDINATION OF OCCUPATIONAL EXPERIENCE -- Describe provisions for supervision, direction or coordination of planned related occupational experience and/or cooperative programs of students. Include assurance that the teacher load will be such that this essential phase of the vocational program may be performed satisfactorily. Provisions for extended contractual time or released time must be included where required.

ADVISORY COMMITTEE -- Indicate the extent of outside recommendations furnished concerning the proposed program. Indicate the manner in which continuing advice and counsel will be sought from the advisory committee.

> WAC 490-36A-030 LOCAL PROGRAM/CRAFT ADVISORY COMMITTEES. All applications for new or expanded program implementation shall include a favorable written recommendation (minutes of the committee meeting signed by the chairperson or secretary and dated prior to the date of submittal) from the local program/craft advisory committee.

INSTRUCTORS -- Indicate name(s), vocational certification status and vocational experience and professional vocational certification number of instructors if available.

FOLLOW-UP -- Where applicable, give plans for assistance in job placement. Describe plans for follow-up of students, surveying employer satisfaction and general program evaluation.

F-133 -- DOCUMENTATION OF COSTS FOR NEW VOCATIONAL EDUCATION CLASSES-- Form F-133-- must be submitted as a part of each new class proposal.

It is recommended that assistance be requested from the Office of the State Superintendent of Public Instruction, Division of Vocational-Technical and Adult Education Services prior to or during initial planning for new classes or programs.

Refer to "Planning Guide for Industrial Arts Vocationally Approved Courses," when preparing a narrative requesting approval for Industrial Arts courses.

Refer to "Planning Guide for Trades and Industries Programs" when preparing a narrative requesting approval for trades and industry courses.

APPENDIX A (5)

SPI — STATE OF WASHINGTON — Superintendent of Public Instruction

VOCATIONAL-TECHNICAL & ADULT EDUCATION SERVICES
Administration
Old Capitol Bldg., FG-11, Olympia, WA 98504

DUE DATES:
1st Semester - no later than 8/15
2nd Trimester - 10/15
2nd Semester - 1/1

DOCUMENTATION OF COSTS FOR NEW VOCATIONAL EDUCATION

School Name _____ District _____
Name Number/County

Proposed Starting Date of New Class _____ Date of this Report _____

_____
Signature of Superintendent of Designee

Signature and Title of Person Preparing this Report _____

INSTRUCTION: USE SEPARATE SHEETS for each NEW CLASS. Also see instructions on reverse side of this form.

Column I		Column II		Column III
Description of New Class	Line	State Acct. Code	Objects of Expenditure	Estimated Costs
Title of New Class	1.	27-2	Teacher Salaries (including extended substitutes contracts)	$
A._____	2.	27-3	Aides for Vocational Programs	$
_____	3.	27-4	Employee Benefits	$
_____	4.	27-5	Instructional Supplies & Materials	$
	5.	27-6	Textbooks & Copyright Materials	$
Vocational Instruction Area	6.	27-7	Contractural Services	$
	7.		Instructional Travel (in/out of District, per diem)	$
B._____	8.	27-9	Capital Outlay	$
	9.	22-	Learning Resources (i.e., audio visual)	$
Method (Co-op or Preparatory)	10.	59-0,7	Field Trips	$
	11.	24-2,3,4, 5,7,8,9,0	Vocational Counseling (certificated Salary Benefits & Clerical that is not a Part of Indirect Costs	$
C._____				
No. of Sections to be offered	12.	21-2,3,4 5,7,8,9	Vocational Supervision, Direction (certificated) Travel Salary, Benefits & Clerical that is not a Part of Indirect Costs	$
D._____				
Estimated Enrollment Per Section	13.		Sub-Total--DIRECT COSTS	$
	14.		Sub-Total--INDIRECT COSTS*	$
E._____	15.		TOTAL (Lines 13 + 14)	$

*INDIRECT COSTS: To estimate indirect costs chargeable to this class(es) use the percentage shown in the most recent Form 196, Part III, Schedule I, column 7 for Program 30. Multiply this percentage by the direct cost sub-total on line 13 and enter on line 14 of this form. One-half the total of lines 4-10 are used to calculate startup grants.

For STATE SPI Use only:

No. of FTE's _____

Cost per FTE $_____

Base FTE Cost $_____

No. of Class Hours Per Section (60, 90, 180, 360)
F._____

Daily Teacher Hours
G._____

SUBMIT FORM IN DUPLICATE

FORM SPI F-133 (Rev 1/85) (V324QA.01)

INSTRUCTIONS

COLUMN I:

Item - Classification of Vocational Instruction Areas

1. Agricultural Education
2. Business & Office Education
3. Community Resource Training
4. Distributive Education
5. Diversified Occupations
6. Health Occupations Education
7. Home & Family Life Ed. (Useful)
8. Home Economics (Gainful)
9. Technical Education
10. Trade & Industrial Education
11. Industrial Arts (Vocationally Approved)
12. Other (Please Identify)

Item C - Classification of Method

Preparatory - Classroom Oriented; classroom work or job simulation; only incidental related paid work experience.

Cooperative - Paid work training in business or industry; related to and coordinated with classroom instruction.

Item D - Number of Sections to be Offered Self-explanatory.

Item E - Definition of Enrollment Per Section

Indicate the number of students expected to enroll and complete at least the number of instruction hours designated in Column I, Item E.

Item F - Calculation of Classroom Contact Hours

Classroom contact hours are usually 60 per trimester, 90 per semester and 180 per year. In computing number of class hours, include shop, lab, or coordinated job training stations where enrollment is claimed. When class time per day differs from 60 minutes including passing time, convert to hours by dividing the actual teacher contact time plus passing time by 60 and multiply the number of days the class meets. (Example: 50 minutes class time + 5 minutes passing time = 55 minutes ÷ 60 = 0.917 X 180 days = 165 hours.)

Item G - Calculation of Daily Teacher Hours

Record the daily total hours that the teacher is assigned to this class. Include classroom time, shop time, lab time, coordination time, home visitation time (explain time assigned in lieu of daily school time if appropriate and approved), or any other class-related time beyond the regular planning period normally provided for all other teaching personnel.

COLUMN II: Please follow items listed by state accounting code. Pro-rate items as needed. (For pro-rating, use instructions on the front of this form under explanation of Indirect Costs.)

Line 8 - INSTRUCTIONAL EQUIPMENT - Amortize items over $1,000 over a 5-year span.

APPENDIX B: SUGGESTED PERIODICALS

A. PROFESSIONAL ORGANIZATION PUBLICATIONS

1. Business Education Forum
   Provided free of charge with membership in NBEA (National Business Education Association)

2. VocEd
   Provided free of charge with membership in AVA (American Vocational Association)

B. BUSINESS AND OFFICE EDUCATION PUBLISHER PUBLICATIONS

1. The Balance Sheet, Century 21 Reporter, and Data Base
   Provided free of charge to business educators by South-Western Publishing Co.

2. Business Education World
   Provided free of charge to business educators by Gregg/McGraw-Hill.

3. Computers in Business Education and Viewpoints in Business Education
   Provided free of charge to business educators by MPC Educational Publishers, a division of Milady Publishing Corporation.

4. Punchline
   Provided free of charge to business educators by The H. M. Rowe Company.

C. OTHER

NOTE: Since special subscription rates are often available, rates are not listed.

1. Classroom Computer Learning
   Subscription Department
   5615 West Cermak Road
   Cicero, IL 60650

2. The Computing Teacher
   135 Education
   University of Oregon
   Eugene, OR 97403

3. Creative Computing
   P. O. Box 13010
   Philadelphia, PA 19101

APPENDIX B (2)

4. Datamation
Technical Publishing Company
875 Third Avenue
New York, New York 10022

5. Family Computing
P. O. Box 2512
Boulder, CO 80321

6. Modern Office Technology
(free subscription offered to qualified recipients)
P. O. Box 91368
Cleveland, OH 44101

7. Office Administration and Automation
Geyer-McAllister Publications, Inc.
P. O. Box 1129
Dover, NJ 07801

8. T.H.E. Journal
(free subscription offered to qualified recipients)
Circulation Department
P. O. Box 15126
Santa Ana, CA 92705-0126

APPENDIX C.1

HARDWARE EVALUATION WORKSHEET

On the tally sheet below, assign an importance factor of 1 to 3 for each category, depending on how important you think each category is to your decision. The factor should be developed by your district committee and should be consistent as you rate various machines. **1 = Not important; 2 = Important; 3 = Very important.**

As you compare machines, give each one a rating of 1 to 3 in each category (**1 = Poor; 2 = Average; 3 = Good**). For example, if dealer service is not available, give it a 1 under the "Service" category; if it is good, give it a 3. If the machine is easily moved and compact, the "Flexibility" category may get a 2 or 3. If no software is available, that category may be given a 1.

When all the categories have been rated, multiply them by the importance factor you originally assigned. The end results are then added together. The highest total will indicate the microcomputer best suited for your uses. Be as sincere as possible to get an unbiased evaluation. Color of the case, unnecessary extras, or the salesperson's personality should not affect the choice.

SAMPLE:

BRAND: Brand X

Category	Importance Factor (1 to 3)	Rating (1 to 3)	Total
Cost	3	2	0
Service	2	1	2
User Training	1	3	3

BRAND:

Category	Importance Factor (1 to 3)	Rating (1 to 3)	Total
Cost			
Service			
User Training			
System Expansion			
Flexibility			
Software			
Memory			
Keyboard			
Display			
Peripherals & Options			
Sound, Music, Voice, Graphics			

APPENDIX C.2

CRITERIA FOR JUDGING MICROCOMPUTER HARDWARE

1. Cost: What is the total cost for the microcomputer? This includes price of any extra equipment you may purchase for the device (e.g., a printer), installation, and costs of cartage as well as the basic purchase price.

2. Servicing: What warranties are available? Can the unit be serviced where you purchased it? Is on-site servicing available? Can local technicians make necessary repairs? For additional cost, will the unit be updated for the next year to reflect refinements? How long does it take for service, including transportation to and from the service facility? What is the service charge including transportation?

3. User Training: Will the vendor provide on-site training? At what cost? How many hours? For how many people?

4. System Expansion: Can the system be expanded easily? What are the limits of the expansion?

5. Flexibility: If necessary, can the unit be readily moved? Has it been tested for durability? How much does it weigh? Must the unit be near an outlet or telephone line to operate? Do students have to be brought to the unit or can the unit be taken to students? Is there a need for special environmental controls (i.e., temperature, humidity, dust, protection from exterior electrical interference including other computers, static charges, another electromagnetic field)? Is a special electrical hook-up required?

6. Software: Are there sufficient manuals, reference and program materials available to support the microcomputer? Are programs, suited to your needs, available? Have outside companies other than the original designer made additional software programs? Is there enough software available to fulfill your needs? Can programs be modified to fulfill your needs? Have the programs been validated (field tested with students)? What is the cost of prepared programs?

7. Memory Capability: How much RAM (random access memory) is the unit capable of? How much RAM can be taped?

8. Keyboard Layout: Most micros come with a standard typewriter layout. If the unit does not, will it fit your needs? Does it have a calculator layout? Is a calculator layout necessary or can the standard typewriter numbers fulfill your calculation needs?

9. Display: Computers must have some way to show their information in visual form. The most common output device is the monitor, a TV-like device designed to be used with computers. Some computers use a standard home TV set through an attachment called an RF (radio frequency) modulator. This device transforms the TV into an output device that can receive and visually display information from the computer.

Monitors come in a variety of forms and qualities. Some display in black and white, black and green, or even amber. Others have full color displays. Some research, and the experience of many users, have indicated that the green screens are easier on the eyes than black and white, while amber screens may be best of all in preventing eyestrain.

As you examine equipment, also keep in mind the following considerations: Does the computer show its information clearly and with line lengths and character ranges that are easy to read? If it is going to be used for word processing or telecommunications, does it allow 80 characters on a single line? Does it display upper and lower case characters?

10. Peripherals & Options: Additional Ports: Can other devices be connected to the unit (e.g., printers, plotters, phone lines)? Are there sufficient ports to support the number of extra devices you need?

    Execution Time and Loading Speed: How long does it take the microcomputer to execute an operation? How fast can information be loaded into the unit? Is the execution time, operation or loading of a program too long for students?

    Input and Output Devices: What input and output devices (e.g., cassette, disk, TV monitor, printer, plotter, graphics tablet, light pen, voice synthesizer) are included with the equipment?

    Extra Equipment: What kind of extra equipment is available (e.g., printer, voice synthesizer)? Do you need these extra devices?

    Mainframe Interface: Does the unit have the ability to interface or connect with available mainframe computers? Do you require such capability?

11. Sound, Music, Voice, Graphics: Editing. Can you edit as mistakes occur? Is editing simple? After the program is completed can you edit? Can you make changes in the program to suit your needs? Will the unit identify specific program errors?

    Graphics/Characters: Is the unit capable of low or high resolution graphics? How many characters per line are available on the micro? How many lines on the display screen are visible? What is the screen size?

    Color: Is color necessary for your operations? If so, will it require a special kind of monitor?

APPENDIX D.1

EDMONDS SCHOOL DISTRICT 15

INSTRUCTIONAL COMPUTER SOFTWARE EVALUATION

Title:_____ Used with grade____ Date previewed_____

Computer:_____ Language:_____ Memory needed:_____K bytes

Input mode: Cassette☐ 5¼ disk☐ Cartridge☐ Other:_____

Color? Yes☐ No☐ Sound? Yes☐ No☐ Average run time_____ min.

Distributor:_____ Copyright date:_____ Cost:_____

1. SUBJECT AREA:_____ GRADE LEVEL(S):_____

2. PROGRAM TYPE: Isolated program☐ Part of a _____(number)-program series.

3. PROGRAM USES:

drill/practice	☐	simulation	☐	problem solving	☐
tutorial	☐	instructional gaming	☐	information	☐

Other_____

4. STUDENT SCORES: no scoring☐ score given to student☐ maintains a file☐

5. TEACHER USE FACTORS:

N/A	low				high	
☐	.	.	.	.	.	content easily modified to classroom needs
	.	.	.	.	.	freedom from need to intervene or assist
	.	.	.	.	.	adequacy of teacher documentation

6. STUDENT USE FACTORS:

low				high	
.	.	.	.	.	user friendliness
.	.	.	.	.	quality of programming
.	.	.	.	.	freedom from distruption by program errors
.	.	.	.	.	student motivation
.	.	.	.	.	level and quality of student interaction
.	.	.	.	.	effective use of computer's capabilities

7. CONTENT

low				high	
.	.	.	.	.	instructional efficiency with regard to objective
.	.	.	.	.	vocabulary and concepts appropriate to level
.	.	.	.	.	compatibility with other materials used

8. OBJECTIONABLE SEX OR ETHIC BIAS? Yes☐ No☐ (If "Yes", please comment below)

RECOMMENDATIONS:

☐ Excellent software: BUY

☐ Recommended purchase when funds are available.

☐ DON'T BUY

☐ Someone else should preview (May be useful at other grade levels).

School:_____ Appraiser's Name:_____

APPENDIX D.1 (2)

TERM (in order of appearance)	EXPLANATION
Used with grade	Fill in only if field tested with students.
Average run time	The time an average student could be expected to take in completing the program.
Distributor	National outlet for the software.
Program cluster	A series of interrelated programs.
Drill/practice	Reinforcement or practice based on instruction provided elsewhere.
Tutorial	Offers direct instruction of new content or skills.
Simulation	Creates a hypothetical situation within which the learner manipulates variables.
Instructional gaming	Tutorial or drill-and-practice programs using a game format.
Problem solving	Student uses computer to solve a problem.
Informational	Programs which organize and deliver information without instructional format.
Content easily modified	The program or specific content can be adapted to local curriculum.
Teacher documentation	Instructions, guides and other printed materials effectively prepare the teacher for use.
User friendliness	Clarity of instructions and displays, simplicity of response, no need for external information.
Quality of programming	Quality of output--content, tone, screen formatting, pacing.
Freedom from disruption...	"Crash proof," uneffected by random errors or mischievous keyboarding.
Student motivation factor...	Attractive, interesting, uses humor, varies approach.
Level and quality of student interaction	Student has frequent active role in response to program.
Effective use...capabilities	Uses branching and other computer characteristics and instructionally sound manner.
Instructional efficiency...	Logical and well organized; objectives achieved.
Vocabulary and concepts...	Level of difficulty appropriate for intended users.
Objectionable sex or ethnic bias..	Reinforces negative values.

APPENDIX D.2

SEATTLE PUBLIC SCHOOLS MEDIA SERVICES
SOFTWARE EVALUATION FORM

Reviewers' Names:_____ School:_____

_____ Date of Review:

_____ _____

Program Title_____ Medium:____5" disk; ____8" disk;
____cartridge; ____ tape

Package Title_____Copyright Date (if any)_____

Microcomputer (brand, model, memory)_____

Necessary Hardware_____Necessary Software_____

Producer_____Author(s)_____

Back-up Copy Policy_____Cost_____

Location of Software_____
(School/Department/Room Number)

PART I: PROGRAM OVERVIEW AND DESCRIPTION

1. Subject area and specific topic_____
2. Prerequisite skills necessary_____
3. Appropriate grade level (circle) 1 2 3 4 5 6 7 8 9 10 11 12 college
4. Type of program (check one or more)

____Simulation	____Testing
____Educational Game	____Classroom Management
____Drill and Practice	____Other (specify)_____
____Tutorial	_____
____Problem Solving	____Remediation
____Authoring System	____Enrichment

5. Appropriate group instructional size:___individual___sm. group___class
6. Is this program an appropriate instructional use of the computer?_____
   _____
   _____
7. Briefly list the program's objectives. Are they clearly stated in the program or in the documentation? Are they educationally valuable? Are they achieved?
   _____
   _____
   _____
   _____
8. Briefly describe the program. Mention any special strengths or weaknesses.
   _____
   _____
   _____
   _____

APPENDIX D.2 (2)

PART II: EVALUATION CHECKLIST

Please check Yes, No, or Not Applicable for each question below. To add information, or to clarify an answer, use "Comments" at the end of each section.

Yes	No	N/A	EDUCATIONAL CONTENT
_____	_____	_____	1. Is the program content accurate?
_____	_____	_____	2. Is the program content appropriate for intended users?
_____	_____	_____	3. Is the difficulty level consistent for material, interest, and vocabulary?
_____	_____	_____	4. Is the program content free of racial, sexual, or political bias?

Comments: _____

_____

Yes	No	N/A	PRESENTATION
_____	_____	_____	1. Is the program free of technical problems?
_____	_____	_____	2. Are the instructions clear?
_____	_____	_____	3. Is the curriculum material logically presented and well organized?
_____	_____	_____	4. Do graphics, sound, and color, if used, enhance the instructional presentation?
_____	_____	_____	5. Is the frame display clear and easy to read?

Comments: _____

_____

Yes	No	N/A	INTERACTION
_____	_____	_____	1. Is the feedback effective and appropriate?
_____	_____	_____	2. Do cues and prompts help students to answer questions correctly?
_____	_____	_____	3. Can students access the program "menu" for help or to change activities?
_____	_____	_____	4. Can students control the pace and sequence of the program?
_____	_____	_____	5. Are there safeguards against students "bombing" the program by erroneous inputs?

Comments: _____

_____

Yes	No	N/A	TEACHER USE
_____	_____	_____	1. Is record-keeping possible (within the program or through documentation worksheets)?
_____	_____	_____	2. Does teacher have to monitor student use?
_____	_____	_____	3. Can teacher modify the program?
_____	_____	_____	4. Is the documentation clear and comprehensive?

Comments: _____

_____

PART III: OVERALL EVALUATION (CHECK ONE)

_____ Excellent; recommend without hesitation. _____ Fair; might want something better

_____ Pretty good program. Consider purchase. _____ Not useful. Do not purchase.

APPENDIX D.3

Spokane Public Schools

Business Education

VENDOR EVALUATION FORM

Software_____ Priority No._____
Course_____ Evaluator_____

1. SUBJECT MATTER: Content has educational value.	Yes	Somewhat	No
2. TECHNICAL PRESENTATION: Program is free of malfunctions.	Yes	Somewhat	No
3. STUDENT INTERACTION: Students are actively involved with the program.	Yes	Somewhat	No
4. PROGRAM INTERACTION: Feedback is effectively employed	Yes	Somewhat	No
5. STUDENT EVALUATION: Evaluation adequately measures student progress.	Yes	Somewhat	No
6. DOCUMENTATION: Documentation is sufficient to run the program.	Yes	Somewhat	No
7. WORK BEHAVIORS: Program assists students in developing positive work attitudes and skills.	Yes	Somewhat	No
8. APPLICATION PROGRAMS: Program performs the task for which it is intended.	Yes	Somewhat	No
9. CLARITY: Program is easy to understand.	Yes	Somewhat	No
10. MENU DRIVEN: Program hierarchy makes sense.	Yes	Somewhat	No
11. CONTINUITY: Program allows a smooth transition from current application.	Yes	Somewhat	No
12. INTERFACE/INTEGRATE: Software automatically processes and connects information to other parts of program.	Yes	Somewhat	No

APPENDIX D.3 (2)

13. CURRICULUM AVAILABLE: Tutorials, reference manuals, other materials.	Yes	Somewhat	No
14. ERROR CORRECTION: Correcting entry errors is easy.	Yes	Somewhat	No
15. OBJECTIVES: Software meets current criteria in course content.	Yes	Somewhat	No
16. MODELING: Finished product resembles prior learning.	Yes	Somewhat	No
17. DISKS: Back ups are provided or can be legally made.	Yes	Somewhat	No
18. DATA DISKS: Individual data disks can be set up for each student.	Yes	Somewhat	No
19. EQUIPMENT: Current equipment can be used.	Yes	Somewhat	No
20. RECOMMENDATION TO ADOPT:	Yes	Somewhat	No

21. COMMENTS:

APPENDIX D.4

microSIFT COURSEWARE EVALUATION

NORTHWEST REGIONAL EDUCATIONAL LABORATORY

Package Title _____ Producer _____

Evaluator Name _____ Organization _____

Date _____ ☐ Check this box if this evaluation is based partly on your observation of student use of this package.

SA-Strongly Agree A-Agree D-Disagree SD-Strongly Disagree NA-Not Applicable

Please include comments on individual items on the reverse page.

CONTENT CHARACTERISTICS

1. SA A D SD NA The content is accurate. (p. 16)
2. SA A D SD NA The content has educational value. (p. 16)
3. SA A D SD NA The content is free of race, ethnic, sex and other stereotypes. (p. 16)

INSTRUCTIONAL CHARACTERISTICS

4. SA A D SD NA The purpose of the package is well defined. (p. 17)
5. SA A D SD NA The package achieves its defined purpose. (p. 17)
6. SA A D SD NA Presentation of content is clear and logical. (p. 17)
7. SA A D SD NA The level of difficulty is appropriate for the target audience. (p. 18)
8. SA A D SD NA Graphics/color/sound are used for appropriate instructional reasons. (p. 18)
9. SA A D SD NA Use of the package is motivational. (p. 19)
10. SA A D SD NA The package effectively stimulates student creativity. (p. 19)
11. SA A D SD NA Feedback on student responses is effectively employed. (p. 20)
12. SA A D SD NA The learner controls the rate and sequence of presentation and review. (p. 20)
13. SA A D SD NA Instruction is integrated with previous student experience. (p. 29)
14. SA A D SD NA Learning can be generalized to an appropriate range of situations. (p. 29)

TECHNICAL CHARACTERISTICS

15. SA A D SD NA The user support materials are comprehensive. (p. 30)
16. SA A D SD NA The user support materials are effective. (p. 31)
17. SA A D SD NA Information displays are effective. (p. 31)
18. SA A D SD NA Intended users can easily and independently operate the program. (p. 32)
19. SA A D SD NA Teachers can easily employ the package. (p. 34)
20. SA A D SD NA The program appropriately uses relevant computer capabilities. (p. 34)
21. SA A D SD NA The program is reliable in normal use. (p. 35)

QUALITY

Write a number from 1 (low) to 5 (high) which represents your judgment of the quality of the package in each division:

_____ Content Characteristics

_____ Instructional Characteristics

_____ Technical Characteristics

RECOMMENDATIONS

☐ I highly recommend this package.

☐ I would use or recommend use of this package with little or no change. (Note suggestions for effective use below.)

☐ I would use or recommend use of this package only if certain changes were made. (Note changes under Weaknesses or Other Comments.)

☐ I would not use or recommend this package. (Note reasons under Weaknesses.)

Describe the potential use of the package in classroom settings.

APPENDIX D.4 (2)

microSIFT COURSEWARE DESCRIPTION

NORTHWEST REGIONAL EDUCATIONAL LABORATORY

Title _____ Version Evaluated _____

Producer _____ Cost _____

Subject/Topics _____

Grade Level(s) (circle) pre-1 1 2 3 4 5 6 7 8 9 10 11 12 post-secondary

Required Hardware _____

Available for Hard Disk? ☐ Yes ☐ No ☐ Unknown

Required Software _____

Software protected? ☐ Yes ☐ No Medium of Transfer ☐ Tape Cassette ☐ ROM Cartridge ☐ 5¼" Flexible Disk ☐ 8" Flexible Disk

Back Up Policy _____

Producer's field test data is available ☐ On Request ☐ With Package ☐ Not Available

INSTRUCTIONAL PURPOSES & TECHNIQUES

(Please check all applicable):

- ☐ Remediation
- ☐ Standard Instruction
- ☐ Enrichment
- ☐ Assessment
- ☐ Instructional Management
- ☐ Authoring
- ☐ Drill and Practice
- ☐ Tutorial
- ☐ Information Retrieval
- ☐ Game
- ☐ Simulation
- ☐ Problem Solving
- ☐ Other _____

DOCUMENTATION AVAILABLE:

Circle P-(Program) or S-(Supplementary Material)

- P S Suggested grade/ability level(s)
- P S Instructional objectives
- P S Prerequisite skills or activities
- P S Sample program output
- P S Program operating instructions
- P S Pre-test
- P S Post-test
- P S Teacher's information
- P S Resource/reference information
- P S Student's instructions
- P S Student worksheets
- P S Textbook correlation
- P S Follow-up activities
- P S Other _____

OBJECTIVES: ☐ Stated ☐ Inferred

PREREQUISITES: ☐ Stated ☐ Inferred

Describe package **CONTENT AND STRUCTURE**, including record keeping and reporting functions